

Aug. 29, 1939.

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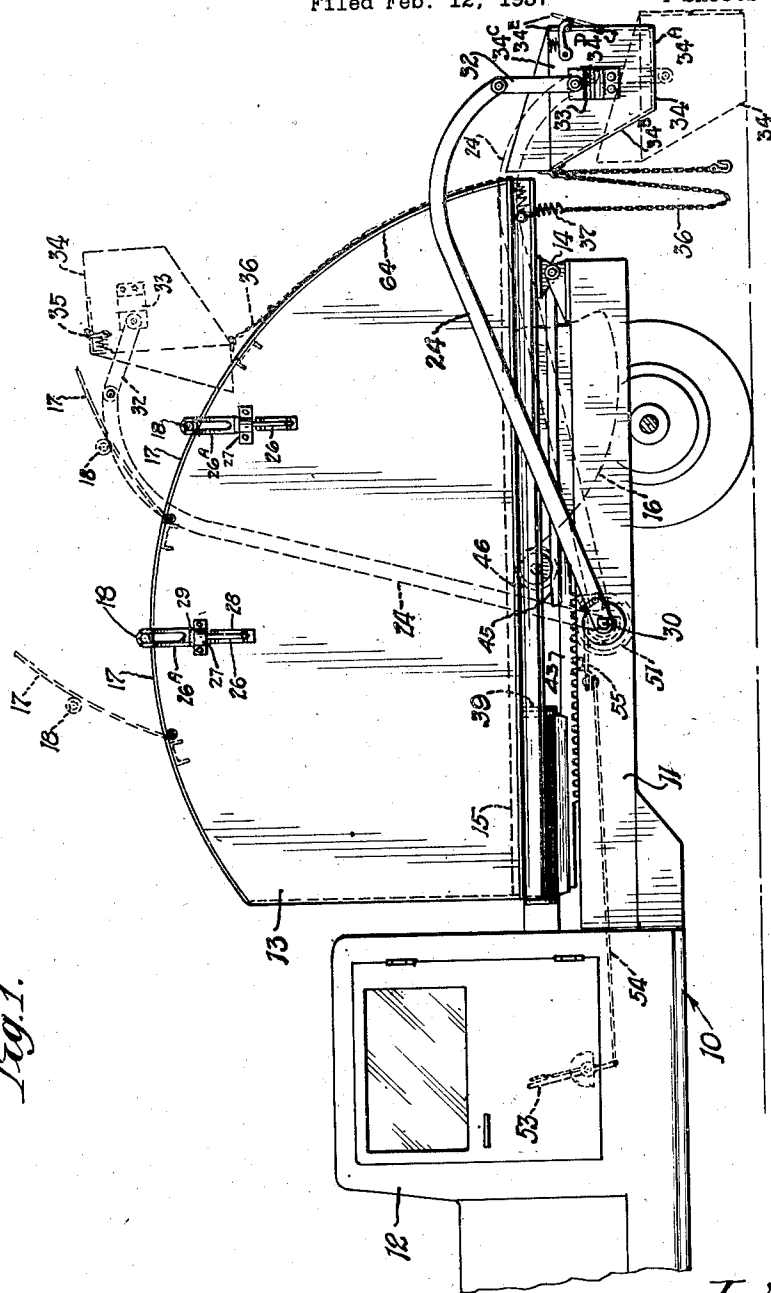
2,170,932

DUMP TRUCK AND LOADER THEREFOR

Filed Feb. 12, 1937

4 Sheets-Sheet 1

Fig. 1.



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4 Sheets-Sheet 2

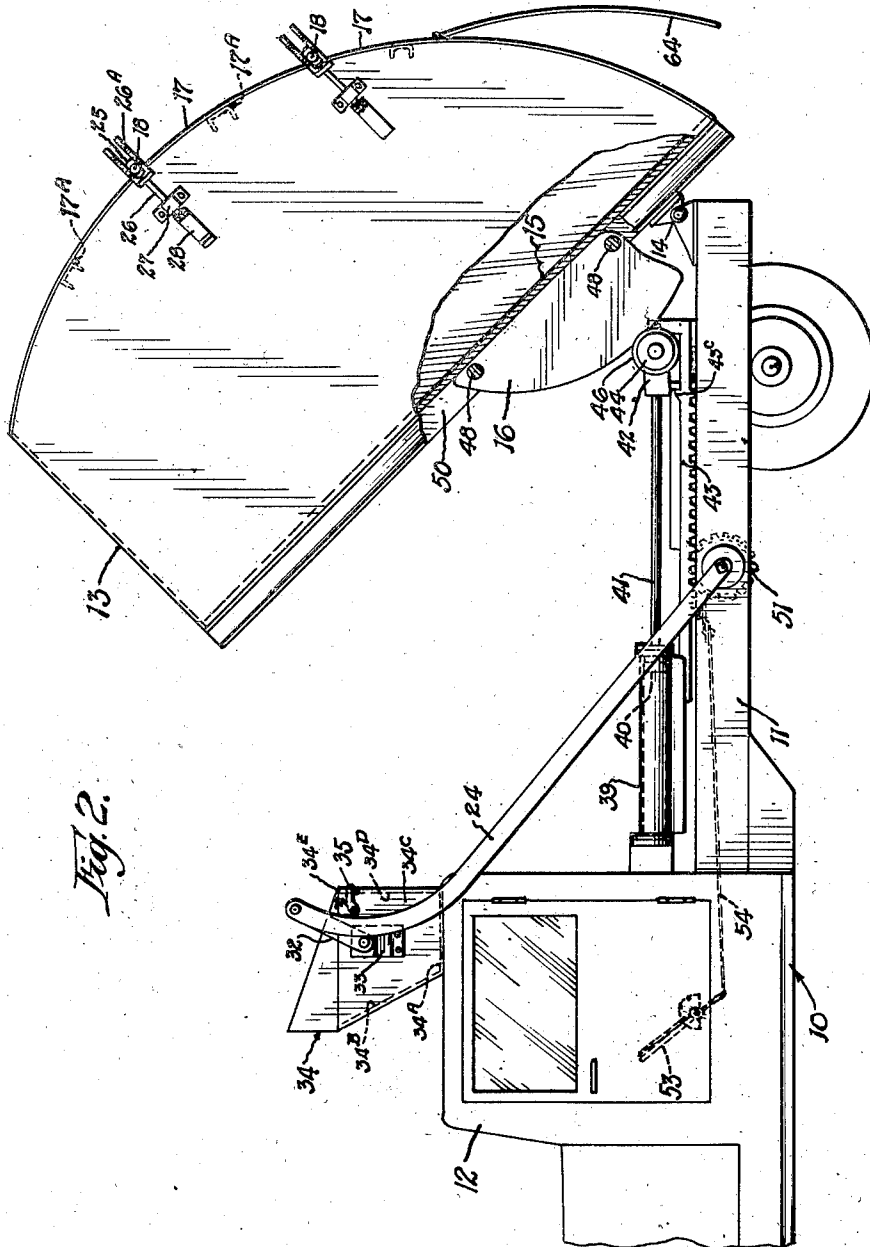


Fig. 2.

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4 Sheets-Sheet 3

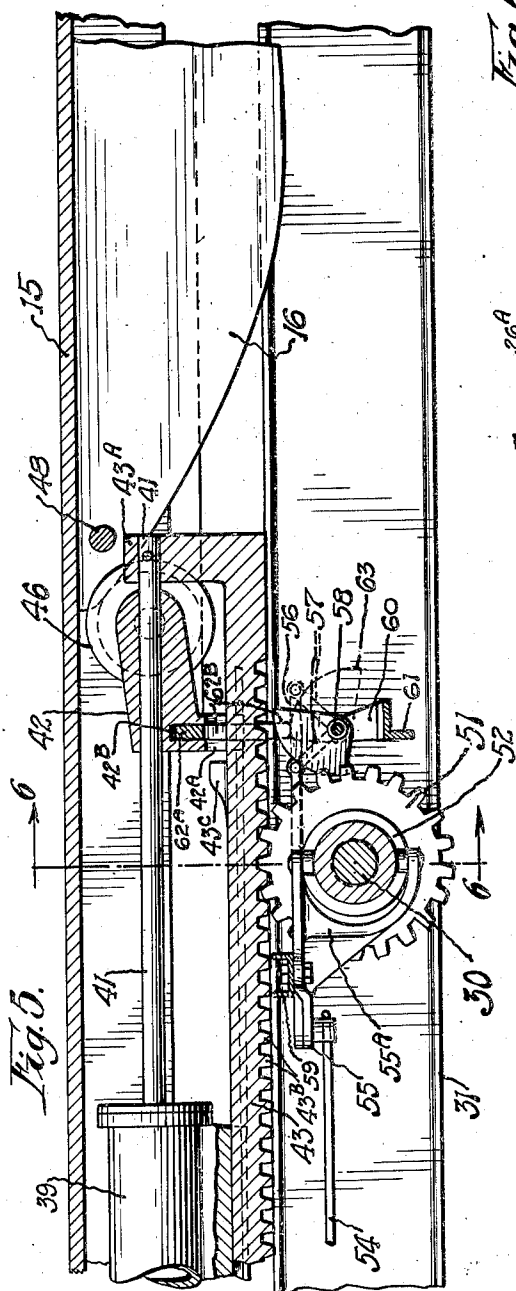


Fig. 4.

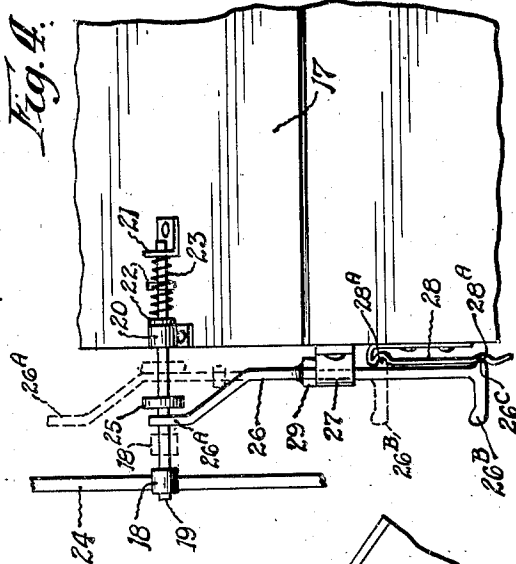
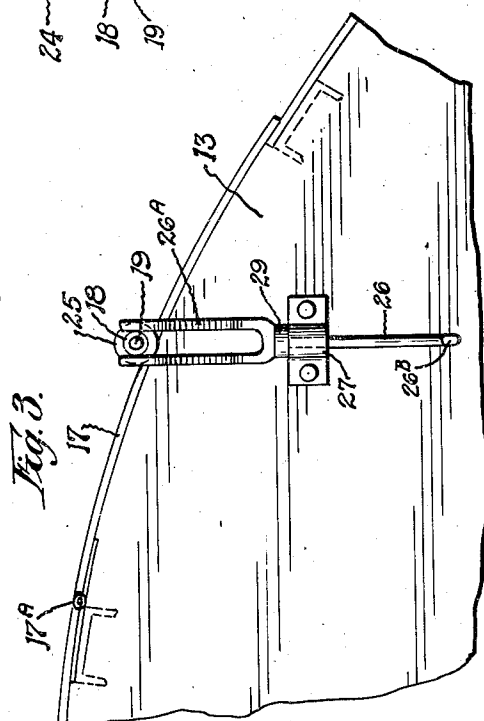


Fig. 3.



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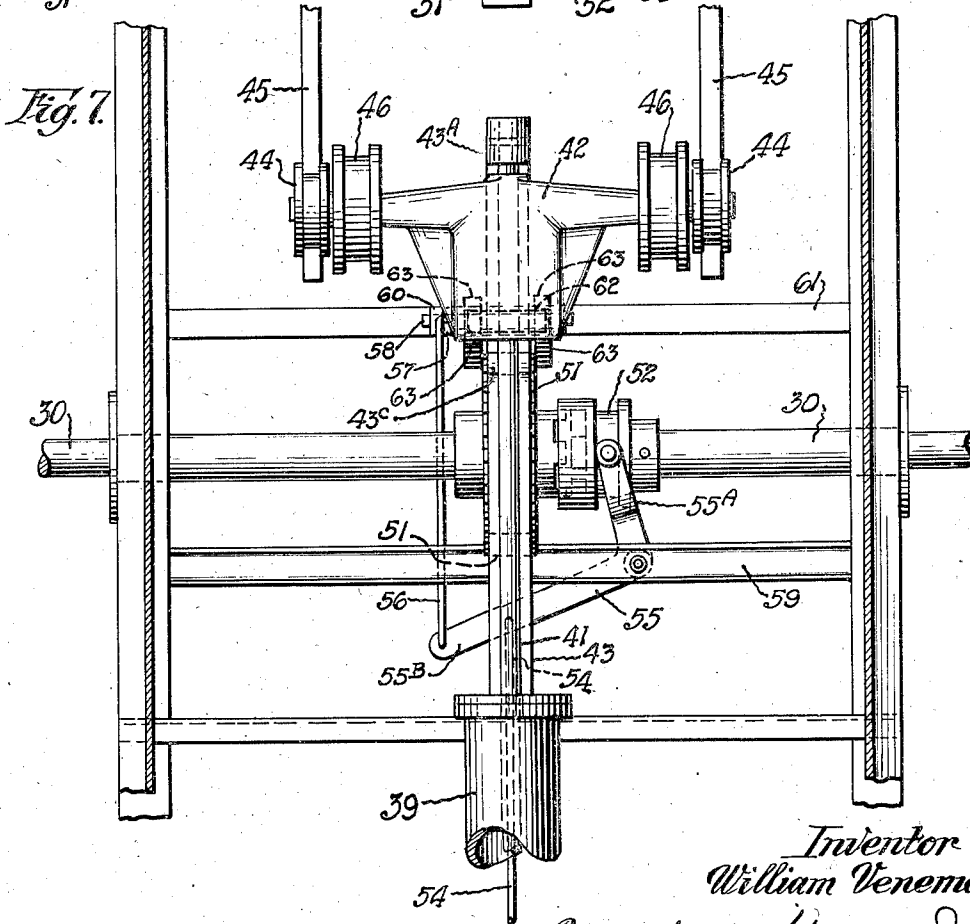
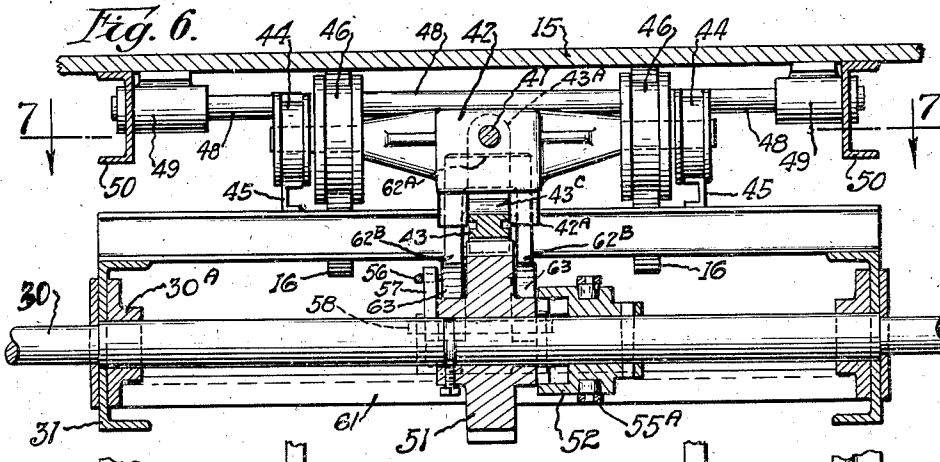
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DUMP TRUCK AND LOADER THEREFOR

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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

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DUMP TRUCK AND LOADER THEREFOR

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Application February 12, 1937, Serial No. 125,397

11 Claims. (Cl. 214—67)

I am aware that dump trucks and mechanism including piston operated means for tilting the body of the vehicle to discharge the contents thereof are old in the art and likewise that various pivotally operated bucket loaders for loading or charging the vehicle body have been disclosed in various patents but, generally stated, my invention is directed to certain novel features affording the utilization of the powered mechanism which is employed for tilting and dumping the vehicle body for also operating the loader for loading or charging the vehicle body. In other words, my invention contemplates the use of a powered mechanism such as a hydraulic cylinder hoist for tilting the vehicle body into dumping position or for operating a bucket loader to charge the vehicle body.

I have preferred to illustrate my invention in an adaptation of its principles to a dump truck having a tilting body pivotally mounted on the truck frame, including a pair of cams secured to the underside of the bottom of the body, a pair of rollers cooperating with the cams for tilting the body and a single hydraulic cylinder hoist for operating the cam-engaging rollers. My invention is however adaptable to types of body tilting mechanisms other than such cam and roller type.

Among the objects of my invention is to provide a novel power mechanism including a single fluid-operated piston adapted to selectively actuate either the means for tilting the vehicle body or the loader operating means.

Another object of my invention is found in the provision of a fluid-operated mechanism including a single reciprocable piston rod operator, means for operatively connecting or disconnecting the piston rod operator respectively to or from the bucket loader operator and separate means for operatively connecting or disconnecting the piston rod operator respectively to or from means for tilting the vehicle body; the arrangement being such that the power of the single piston rod operator may readily be employed to either tilt the vehicle body or to operate the bucket loader.

Still another object of my invention resides in the provision of a bucket loader operator for a dump truck including a pair of bucket-supporting arms pivotally mounted on the truck or on the ends of an operating shaft and means for reversibly rotating the shaft responsively to the reciprocation of a power-operated piston rod operatively connected to a toothed rack which is in mesh with a toothed pinion adapted to be oper-

atively connected or disconnected respectively to or from the operating shaft.

A further object of my invention resides in the provision of means for operatively connecting or disconnecting the body tilting cam-engaging rollers respectively to or from actuation by the piston rod; such means including a disengageable connection between the toothed rack and a cross-head supporting the cam-engaging rollers.

A still further object of my invention is found in the provision of pivoted doors for the body which are selectively automatically operable to opened or closed positions by the bucket-supporting arms through a pair of rollers on each door adapted to be engaged by the bucket-supporting arms to lift the door and on reverse movement permit the door to close by gravity after the discharge of the bucket.

It is also a feature of my invention to provide the body doors with rollers which are normally disposed in alignment with the loader arms but which can be moved into positions out of alignment to clear such arms.

With the above and other objects in view, my invention consists in the novel combination, construction and arrangement of the parts and members shown in preferred embodiment in the attached drawings, described in the following specifications and particularly pointed out in the appended claims.

In the drawings:

Fig. 1 is a side elevation of a tiltable-body truck embodying my invention;

Fig. 2 is a side elevation of the truck showing the body tilted into dumping position;

Fig. 3 is an enlarged end view of one of the door rollers and the retainer therefor;

Fig. 4 is a side view of the door roller and retainer shown in Fig. 3;

Fig. 5 is a longitudinal section through a portion of the hydraulic power mechanism adapted for tilting the truck body or for operating the bucket loader;

Fig. 6 is a cross-section taken on line 6—6 of Fig. 5; and

Fig. 7 is a sectional plan view taken on line 7—7 of Fig. 6.

In the illustrated embodiment of my invention as here shown in the drawings, the truck generally indicated by numeral 10 includes a frame 11, an operator's cab 12 and body 13 pivotally mounted on the rear end of the truck frame on suitable spaced brackets as indicated by 14.

Spaced centrally of the truck and body and

attached to and underneath the floor 15 of the body is a pair of metallic cams 16.

The top of the body 13 is of arcuate form. One or preferably a pair of charging openings having doors 17 hinged at one end as at 17A are provided in the top of the body. Each door 17 is provided on each side thereof with a roller 18 loosely mounted on the end of a shaft 19 which is slidably supported in a bearing 20 and an angle support 21. Both bearing 20 and angle 21 are fixed to the top of the door. A collar 22 fixed to the shaft 19 limits its outward movement by engagement with the bearing 20 and a coil spring 23 is interposed between the collar 22 and angle 21 to normally maintain the rollers 18 disposed within the paths of the arms 24 of the bucket loader.

The construction and operation of the bucket loader and its arms 24 will be described later in the matter to follow but it may now be stated that the doors 17 are arranged to be opened through the engagement of the rollers 18 by the swinging bucket arms 24 and the doors 17 are arranged to close by gravity upon reverse movement of the arms 24. Since the rollers 18 on both doors 17 are disposed within the path of the arms 24 means must be provided for retracting the pair of rollers of one door inwardly out of the path of the arms 24 to permit use of the other door, or in the event it is desired to swing the arms 24 and the loading bucket forwardly of the truck to a position near the cab 12 to permit the body 13 to be tilted into dumping position then the rollers 18 on both doors 17 must be moved inwardly to permit the bucket arms 24 to be swung past such rollers without opening the doors 17. Such retracting means are provided, as for example in the illustrations in Figs. 3 and 4, and includes an engageable member 25 in the form of a circular collar fixed to shaft 19. A shiftable bar 26 is slidably mounted in bearing 27 under each door roller. The bar 26 is formed with an outwardly bent forked end 26A which embraces the shaft 19 adjacently to member 25 and is adapted upon upward movement to engage the member 25 and by cam effect of the outwardly bent forked end to shift the member 25 and shaft 19 with the roller 18 against the pressure of spring 23 inwardly out of the path of the bucket arm 24. At its lower end the bar 26 is provided with a bent handle portion 26B having a projection 26C on its rear face which is adapted to be seated in either one of the grooves 28A in the face of the leaf spring 28 securely mounted on the side of the body. The grooves 28A being arranged to frictionally retain the bar 26 in raised or lowered positions and a collar 29 secured to bar 26 limits its lowermost position by its engagement with one end of the bearing 27.

The arms 24 are securely fixed to the ends of an operating shaft 30 rotatably supported in suitable bearings 30A mounted rigidly on the structural side members 31 of the truck frame. The upper ends of the arms 24 are preferably curved and pivotally connected to links 32 which are pivotally connected to brackets 33 rigidly secured to the sides of the loading bucket 34.

The bucket 34 consists of a bottom 34A, an angular discharge side 34B, ends 34C, and a side comprising a rigid portion 34D and a hinged upper portion 34E which may be released from the latches 35 to drop position to facilitate loading of the bucket when supported on the ground as shown dotted in Fig. 1.

In the swinging movement of the arms 24, the bucket 34 will be lifted upwardly over the top of

the body 13 and the rollers 18 of the desired door 17 will be engaged by the arms 24 to lift the door to open position to permit the body 13 to receive the charge from the bucket 34 as it is tilted into discharge position by the chain 36 one end of which is connected near the discharge edge of the bucket and the other to a spring 37 which is fixed to an underneath portion of the body. Since the bucket in the present case is adapted to discharge into two different openings in the top of the body, obviously, the chain 36 is provided with two spaced hooks to permit movement of the bucket into two different dumping positions.

I will now describe the novel power-driven mechanism which is adapted to selectively operate the bucket loader or to tilt the truck body into dumping position.

One of the most important features of my invention resides in the selective utilization of a single power unit mounted on the truck frame for tilting the truck body or for operating the loader therefor.

Hydraulic power may be used and in such case the well known power unit will include the cylinder with piston and piston rod, a power take-off to fit the truck transmission, a heavy duty oil pump, a pump drive shaft connected to the power take-off, a 3-way control valve incorporated in the pump body and operable from the driver's seat for regulating and controlling the raising, holding and lowering of the truck body or for operating the bucket loader, and three control levers at the driver's seat, one for operating the power take-off, one for operating the 3-way pump valve, and one for selectively operatively coupling the power unit with the body dumping instrumentalities or with the bucket loader.

The power-driven mechanism which I have selected to illustrate the principles of my invention is more clearly shown in Figs. 5, 6 and 7. The hydraulic cylinder 39 which is rigidly suitably mounted on the truck frame and includes a piston 40 and piston rod 41 the exterior portion of which is slidably extended through a cross-head 42 and the end of which is rigidly connected to an upstanding end portion 43A of a toothed rack 43 so that the rack 43 reciprocates with the piston rod 41.

The teeth 43B of the rack 43 are formed on its lower face and the upper face is arranged for slidable support in a suitably extended portion of the wall of the cylinder 39.

The cross-head 42 is provided with a pair of supporting flanged rollers 44 which are arranged to ride on tracks 45 also rigidly secured to the truck frame. Disposed inwardly of and adjacently to the supporting rollers 44 is a pair of flanged cam-operating rollers 46 which are aligned for engagement with a pair of spaced body cams 46 mounted on shafts 48 in bearings 49 securely fixed under the lower face of the floor of the tiltable body 13 to suitable structural members 50 which are secured to the body floor.

Since the piston rod 41 extends through the cross-head 42 it is readily apparent that the outer end of the rack 43, which is fixed to the end of the piston rod 41, is also supported on the cross-head 42 and its rollers 44.

Centrally and loosely mounted on shaft 30 is a gear 51 which is always in mesh with the teeth of the rack 43.

As shown in Figs. 6 and 7, the gear 51 is in operative engagement with a clutch 52 which is always operatively connected to shaft 30 and

which may be disengaged from gear 51 in the event it is desired to operatively disengage the bucket operating shaft 30. This disengagement of clutch 52 from gear 51 is accomplished by the movement of lever 53 in the driver's cab which is connected by rod 54 to a bell crank 55 having a forked end 55^A in operative engagement with clutch 52 whereby same may be shifted into and out of engagement with gear 51. The bell crank 55 is pivotally mounted on the cross-member 58 of the truck frame.

When the clutch 52 is coupled with the gear 51 the bucket arms 24 may be swung to raise the bucket 34 from its loading position at the rear end of the truck into discharge position for either one of the two body openings, or into position beyond the forward end of the truck to clear the body during its tilting, and as above stated, when the bucket loader is operated, the cross-head 42 with its cam-engaging rollers 46 is operatively disconnected from the rack 43. This condition is illustrated in Figs. 5, 6 and 7.

When the driver wishes to tilt the body 13, the bucket is moved to the forward end of the truck and disconnected from operation with shaft 30 by a movement of lever 53 to disengage clutch 52 from the gear 51 and in such movement the bell crank end 55^B will move rearwardly of the truck and through its connection with link 56 will cause the arm 57, which is keyed to shaft 58, to swing rearwardly of the truck to rotate shaft 58.

The shaft 58 is rotatably mounted in bearings 60 fixed to a suitable truck cross-member 61.

The cross-head 42 is provided with spaced depending portions 42^A embracing the sides of the rack 43 arranged to permit sliding movement of the rack 43 and its tooth 43^C therebetween. The depending portions 42^A and the inner integral end of the cross-head are also provided with a vertically disposed slot 42^B adapted to receive a coupling yoke 62 loosely mounted therein.

The yoke 62 comprises a top cross-member 62^A and a pair of vertically disposed side members 62^B.

The coupling yoke 62 functions as a coupling means or connection between the rack 43 and the cross-head 42. When the yoke 62 is raised into inoperative position by means of a pair of cams 63 which are rigidly fixed to shaft 58, the rack 43 and its tooth 43^C will pass between the depending portions 42^A and under the yoke cross-member 62^A without moving the cross-head 42. The elements are illustrated in this condition in Figs. 5, 6 and 7.

But as stated above, in the tilting operation of the truck body 13, the shifting of lever 53 will disengage clutch 52 from gear 51 and will through the simultaneous movement of link 56, arm 57, and shaft 58 cause the cams 63 to be lowered to permit the yoke 62 to slide by gravity into such position that its cross-member 62^A will rest on the top face of the rack 43 and will become an abutment engageable by the rack tooth 43^C to thus form a coupling between the rack 43 and the cross-head 42 and in the forward movement of the piston rod 41 and the rack 43, the cross-head 42 will be moved forwardly with its rollers 46 pushing against the cams 16 to raise the body 13 about its pivot 14 into tilted dumping position whereupon the pivoted end gate 64 of the body 13 will open by gravity to permit the discharge of the contents of the truck body therethrough.

A reverse operation of the 3-way control valve will cause a reverse movement of the pis-

ton rod 41 and its associated rack 43 and cross-head 42 to permit the body 13 to be lowered into loading position on the truck frame, and if then the lever 53 is moved in the opposite direction, the clutch 52 will be moved in operative engagement with gear 51 to cause operation of shaft 30 and bucket loader through the operative connection existing between the gear 51 and rack 43 but in such event the cross-head 42 will be operatively disengaged from the rack 43 since shaft 58 will have been rotated with its cams 63 to raise the coupling yoke 62 to permit the rack 43 and its tooth 43^C to pass freely through and between the yoke depending portions.

I am aware that after the perusal of the above description and attached drawings various other means and arrangements for engaging and disengaging the power-actuated unit respectively to and from the body tilting means or to and from the loader operating means, may be readily devised and substituted for those which I have preferred to show as an example or illustration of one embodiment of my invention, hence I do not wish to limit myself to such particular design of mechanism, details of construction and arrangement shown and described herein and my intention is to claim my invention as broadly as the state of the art permits.

I claim:

1. In a dump truck having a tilting body and a bucket loader for loading said body, the combination with a single source of power, of a power-actuated member operable by said single source of power, means for tilting said body, means for operating said bucket loader, and instrumentalities for selectively operatively connecting said power-actuated member with either one of said means for operative movement thereof independently of the movement of the other of said means, said bucket loader being supported on the chassis of the dump truck for movement independent of the movement of said truck body.

2. In a dump truck having a tilting body and a pivotally mounted loading bucket for loading said body, the combination of a single source of power, a power-actuated member, means for tilting the body, means for operating said loading bucket, and instrumentalities for selectively operatively connecting said power-actuated member with either one of said means to thereby move the selected one of said means independently of the movement of the other of said means, said bucket loader being supported on the chassis of the dump truck for movement independent of the movement of said truck body.

3. In a dump truck having a tilting body and a pivotally mounted loading bucket for loading said body, the combination of a single source of power, a power-actuated reciprocating member, means for tilting said body, means for reciprocating said loading bucket between its loading and unloading positions, and selectively operable devices for operatively connecting said power-actuated reciprocating member with either of said means, said body being tiltable without moving said bucket.

4. In a dump truck having a tilting body and a bucket loader for loading said body, the combination of a power-actuated reciprocable member operatively connected to a single source of power, means for tilting said body, means for operating said bucket loader, and instrumentalities for selectively operatively connecting said power-actuated reciprocable member with either one of said means without moving the other of said means.

5. In a dump truck having a chassis, a tiltable body and a loading bucket adapted to be moved from a lower level to a higher level over the top of said truck body and to discharge its contents into said truck body, a single reciprocable power-actuated member on said truck, means for tilting said body, means for raising and lowering said loading bucket supported on said truck chassis, means for discharging said bucket, clutch-operated means for operatively connecting said power-actuated member with said bucket raising and lowering means, and separate means for operatively connecting said power-actuated member with said body tilting means.
6. In a dump truck having a tiltable body and a loading bucket adapted to be moved from a lower level to a higher level over the top of said truck body and to discharge its contents into said truck body, said loading bucket being mounted on the chassis of said truck, a power-actuated member on said truck and continuously connected to a single source of power, means for tilting said body, means for raising and lowering said loading bucket, means for discharging said bucket, clutch-operated means for operatively connecting said power-actuated member with said bucket raising and lowering means, and separate means for operatively connecting said power-actuated member with said body tilting means, said truck body being movable into discharge position independently of the movement of said bucket.
7. In a dump truck as embodied in claim 5 and including operating means connecting said body tilting means and said bucket raising and lowering means arranged for selectively connecting said power-actuated member with said body tilting means and simultaneously disconnecting said bucket raising and lowering means and vice versa.
8. In a dump truck, and in combination, a tilting body mounted on said truck, a pair of cams fixed to said body, a movable tilting member mounted on said truck including a pair of rollers adapted to forcibly engage said cams to tilt said body, a shaft rotatably mounted on said truck, a pair of arms connected to said shaft, a loading bucket carried by said arms and adapted to be moved by said arms from its loading position into discharge position above said body, a single power-actuated piston member, coupling means for operatively coupling said power-actuated member with said movable tilting member, separate coupling means for operatively coupling said power-actu-

ated member with said shaft to oscillate said bucket-supporting arms, and operating means connected to both of said coupling means whereby either one or the other of said coupling means is adapted to be selectively placed into coupling operation to either tilt the body or to operate the loading bucket, said body being tiltable without moving the bucket or its supporting arms.

9. In a dump truck having a tilting body and a loading bucket pivotally mounted on the truck and in combination, a power-actuated reciprocable rack, a shaft mounted on the truck, a gear loosely mounted on said shaft and in mesh with said rack, means for tilting said body, coupling means arranged to form an operative connection between said gear and said shaft, separate coupling means arranged to form an operative connection between said rack and said body tilting means, and means for disengaging the coupling connection in either of said coupling means.

10. In a dump truck having a tilting body with an arcuate top, and in combination, a plurality of hinged doors on said arcuate body top, a pair of axially bodily shiftable rollers on each of said doors, said rollers being supported to extend beyond the sides of said body, a pivotally mounted arm on each side of said body, a bucket carried on the free ends of said arms, power-operated means for swinging said arms and bucket into selected discharge positions above the top of the body, said rollers normally extending into the paths of said arms and being engageable by said arms to lift said doors into open position to permit the bucket to discharge its contents into the body, and means for axially shifting one or more of the pairs of said rollers out of the path of said arms to permit said arms to pass such shifted pair or pairs of rollers and to engage an extended pair of rollers to open a selected door or to permit such arms to bypass all of said rollers to position the bucket forwardly of the truck to permit the tilting of the truck body.

11. In a dump truck as embodied in claim 10 and including resilient means for retaining said rollers in extended positions within the paths of said bucket-supporting arms, and each of said rollers having a shaft and a collar on said shaft, and said shifting means comprising a slidably mounted cam member adapted to engage said collar to shift said shaft and roller out of the path of the bucket arm.

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